

WHAT IS CLAIMED IS:

1. A device for computing circuit paths between a first node and a second node within a network, the network including a plurality of elements, the device comprising:
  - 5 code devices arranged to create a primary circuit path between the first node and the second node, the primary circuit path including a first protected link selected from the plurality of elements, wherein the code devices arranged to create the primary circuit path are arranged to include at least one protected link in a protectable segment of the primary circuit path;
  - 10 code devices arranged to create an alternate circuit path between the first node and the second node, wherein the alternate circuit path is arranged to protect at least the protectable segment of the primary circuit path; and
  - a medium which stores the code devices.
- 15 2. The device as recited in claim 1 wherein the at least one protected link is a link with 1+1 protection.
3. The device as recited in claim 1 wherein the code devices arranged to create the alternate circuit path includes code devices arranged to create the alternate circuit path
  - 20 using the at least one protected link.
4. The device as recited in claim 3 wherein the at least one protected link is a link with 1+1 protection.
- 25 5. The device as recited in claim 1 further including code devices which enable at least one element of the plurality of elements which is required in the alternate circuit path to be substantially specified, wherein the code devices arranged to create an alternate circuit path are arranged to create the alternate circuit path using the at least one element of the plurality of elements which is required.
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6. The device as recited in claim 5 wherein the at least one element of the plurality of elements which is required in the alternate circuit path is a third node which is associated with a beginning of the at least one protected link and a fourth node which is associated with the end of the at least one protected link.

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7. The device as recited in claim 1 wherein the device is associated with the first node.

8. The device as recited in claim 1 further including code devices arranged to  
10 implement the primary circuit path and the alternate circuit path.

9. The device as recited in claim 1 wherein the primary circuit path is a lowest cost circuit path between the first node and the second node and the alternate circuit path is a lowest cost circuit path between the first node and the second node which protects the  
15 primary circuit path.

10. The device of claim 1 wherein the code devices arranged to create the alternate circuit path between the first node and the second node include:

code devices for assigning a cost to the at least one protected link;  
20 code devices for assigning costs associated to each link of a plurality of links included in the plurality of elements, wherein the cost assigned to the at least one protected link is substantially lower than the costs associated with each link of the plurality of links; and

code devices for considering costs associated with the plurality of and the cost  
25 associated with the at least one protected link to determine the alternate circuit path.

11. A method for computing an overall circuit path within a network, the overall circuit path including a primary path and an alternate path, the primary path being defined between a start node and a destination node, the method comprising:

30 determining the primary path using a routing algorithm, wherein the primary path includes a protectable segment which has a first line-protected link; and

creating the alternate path using the routing algorithm, wherein creating the alternate path includes creating the alternate path between the start node and the end node such that the alternate path is arranged to protect at least the protectable segment which includes the first line-protected link.

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12. The method of claim 11 wherein the protectable segment is a path-protected segment that includes the first line-protected link and the alternate path is arranged to protect the path-protected segment.

10 13. The method of claim 11 wherein creating the alternate path using the routing algorithm further includes creating the alternate path such that the alternate path includes the first line-protected link.

14. The method of claim 13 further including:

15 specifying that a first node associated with the start of the first line-protected link and a second node associated with the end of the first line-protected link are included in the alternate path.

15. The method of claim 11 wherein the primary path is the shortest path between the start node and the destination node.

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16. The method of claim 11 wherein the primary path is the lowest cost path between the start node and the destination node.

25 17. The method of claim 16 wherein creating the alternate path using the routing algorithm includes considering costs associated with a plurality of links associated with the network and a cost associated with the first line-protected link, the cost associated with the first line-protected link being substantially lower than the costs associated with the plurality of links.

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18. The method of claim 11 wherein the overall circuit path is a unidirectional path-switched ring.

19. A method for computing an overall circuit path within a network, the overall circuit path including a primary path segment and an alternate path segment, the primary path segment being defined between a start node and a destination node, the method comprising;

determining the primary path segment to include at least one line-protected link between the start node and the destination node; and

10 determining the alternate path segment to substantially start at the start node and end at the destination node, wherein the alternate path segment is arranged to protect the primary path segment that includes the at least one line-protected link.

20. The method of claim 19 wherein the alternate path segment includes the at least one line-protected link.

21. The method of claim 19 wherein the overall circuit path is a unidirectional path-switched ring.

20 22. The method of claim 19 wherein the at least one line-protected link is arranged between a first node and a second node, and wherein the alternate path segment is not switched through the first node or the second node.

23. The method of claim 19 wherein the primary path segment is a lowest cost path segment between the start node and the destination node.

24. A device for computing an overall circuit path within a network, the overall circuit path including a primary path segment and an alternate path segment, the primary path segment being defined between a start node and a destination node, the device comprising;

code devices for determining the primary path segment to include at least one line-protected link between the start node and the destination node;

code devices for determining the alternate path segment to substantially start at the start node and end at the destination node, wherein the alternate path segment is  
5 arranged to protect the primary path segment that includes the at least one line-protected link; and

a medium that stores the code devices.

25. The device of claim 24 wherein the alternate path segment includes the at least  
10 one line-protected link.

26. The device of claim 24 wherein the overall circuit path is a unidirectional path-switched ring.

15 27. The device of claim 24 wherein the at least one line-protected link is arranged between a first node and a second node, and wherein the alternate path segment is not switched through the first node or the second node.

28. A device for computing circuit paths between a first node and a second node  
20 within a network, the network including a plurality of elements, the device comprising:  
code devices arranged to enable a determination to be made regarding whether at least one protected link selected from the plurality of elements may be included in a protectable segment of a primary path;

code devices arranged to create a primary circuit path between the first node and  
25 the second node which includes the at least one protected link when it is determined that the at least one protected link may be included in the protectable segment of the primary path, wherein the code devices arranged to create the primary circuit path are arranged to include the at least one protected link in the protectable segment of the primary circuit path;

code devices arranged to create an alternate circuit path between the first node and the second node when it is determined that the at least one protected link may be included in the protectable segment of the primary path, wherein the alternate circuit path is arranged to protect at least the protectable segment of the primary circuit path; and  
5 a medium which stores the code devices.

29. The device as recited in claim 28 wherein the at least one protected link is a link with 1+1 protection.

10 30. The device as recited in claim 28 wherein the code devices arranged to create the alternate circuit path includes code devices arranged to create the alternate circuit path using the at least one protected link.

31. The device as recited in claim 28 further including:

15 code devices arranged to create a primary circuit path between the first node and the second node which does not include the at least one protected link when it is determined that the at least one protected link may not be included in the protectable segment of the primary path; and

code devices arranged to create an alternate circuit path between the first node  
20 and the second node, wherein the alternate circuit path is arranged to protect the primary circuit path.